

ABSTRACT

A vertical color filter detector group according to the present invention is formed on a semiconductor substrate and comprises at least six layers of alternating p-type and n-typed doped regions. PN junctions between the layers operate as photodiodes with spectral sensitivities that depend on the absorption depth versus wavelength of light in the semiconductor. Alternate layers, preferably the n-type layers, are detector layers to collect photo-generated carriers, while the intervening layers, preferably p-type, are reference layers and are connected in common to a reference potential referred to as ground. Each detector group includes a blue-sensitive detector layer at an n-type layer at the surface of the semiconductor, a green-sensitive detector layer at an n-type layer deeper in the semiconductor, and a red-sensitive detector layer at the n-type layer deepest in the semiconductor. The blue-sensitive detector layer at the surface of the semiconductor may have a reference layer only below it, while the red- and green-sensitive detector layers have reference layers above and below them. Three sets of active pixel sensor circuitry are coupled to the three detector layers, such that three active pixel sensors are

formed using the group of three co-located detectors of the vertical color filter detector group.